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Guadalupe Creek Mitigation Project: Inventory of Geomorphic, Fisheries, Soil, and Vegetation Conditions

Prepared for:

Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118
Contact: Joseph Chen, P. E.
(408) 265-2607

Prepared by:

Jones & Stokes
2880 Zanker Road, Suite 210
San Jose, CA 95134
Contact: Kevin MacKay
(408) 434-2244

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Table of Contents

INTRODUCTION 1

OVERVIEW OF SITE INVENTORY APPROACH 1

MAP SERIES 2

GEOMORPHIC AND FISHERIES HABITAT 3
  Geomorphic and Fisheries Habitat Features 3
  Mapping and Field Data Collection Methodology 4

SOILS AND GROUNDWATER HYDROLOGY 7
  Soil and Groundwater Hydrology Features 7
  Mapping and Field Data Collection Methodology 7
  Existing Soil Survey Information 9
  Soil Map Units 9
  Groundwater Hydrology 12

VEGETATION 12
  Vegetation Features 13
  Mapping and Field Data Collection Methodology 13
  Understory and Midstory Vegetation Types 14

CITATIONS 16

Appendix A. Soil Profile Descriptions, Guadalupe Creek Mitigation Project Site

List of Tables and Figures

Facing Page

Table

1 Descriptions of Soil Map Units....10

Figure

1 Sketch Illustrating Different Types of Geomorphic Surfaces Mapped During Site Inventory....4

Guadalupe Creek Mitigation Project: Inventory of Geomorphic, Fisheries, Soil, and Vegetation Conditions

INTRODUCTION

This report and the accompanying maps present the results of a November 1999 site inventory conducted jointly by senior staff from Jones & Stokes and Northwest Hydraulic Consultants (NHC) at the proposed Guadalupe Creek Mitigation Project site. The project site includes 8,700 linear feet of Guadalupe Creek between Almaden Expressway and Masson Dam, San Jose, California. This report and the accompanying maps document existing site conditions with respect to stream geomorphology, fisheries habitat, soils, and vegetation, and represent the initial step in the planning, analysis, and design of shaded riverine aquatic (SRA) habitat mitigation for the project area.

The maps accompanying this report will serve several purposes in the planning, analysis, and design of SRA habitat for the project reach of Guadalupe Creek. First, these maps document existing or baseline conditions at the project site. Detailed information on baseline site conditions will be useful in defining the environmental setting for the project and in quantifying changes associated with various project alternatives. Second, the maps provide valuable insight into the relationships between stream geomorphology, existing fisheries habitat conditions, soils, and vegetation. An understanding of these relationships is important in developing design criteria and project alternatives that incorporate functional relationships between physical and biological characteristics in the stream corridor. These maps thus provide the basis for restoring SRA habitat as a component of a functioning stream system. Third, the maps provide detailed information that will be used in development of project alternatives, in refinement of a preferred alternative, and in detailed design of the project, including preparation of construction drawings for project implementation. Finally, baseline information may also be used to evaluate project success during the monitoring phase of the project.

OVERVIEW OF SITE INVENTORY APPROACH

Field surveys of the project site were conducted November 8-19, 1999. Senior scientists and engineers from Jones & Stokes and NHC developed the mapping protocol used during the field surveys. During an initial field visit, the mapping protocol was tested by the project group and further refined to reflect site-specific conditions. The methods used in mapping stream geomorphology, fisheries habitat, soils, and vegetation are described below in more detail. Technical specialists for each element of the site inventory, including stream geomorphologists, fisheries biologists, vegetation ecologists, botanists, and soil scientists, were divided into three field teams based on area of expertise: the geomorphic and fisheries habitat mapping team, the soils mapping team, and the vegetation mapping team. Field teams mapped site characteristics in the field, using a single set of base maps.

The set of base maps consisted of 1:240 (1 inch = 20 feet) digital ortho-rectified aerial photographs (dated August 1999) overlain with 1-foot topographic contours provided by the Santa Clara Valley Water District (District). In general, features in the field were easily identified and located on the base maps. Field measurements used in mapping were made relative to landmark features visually identified on the base maps.

Accuracy and uniformity of field mapping for the three field teams was enhanced by mapping the subject areas sequentially. Geomorphic and fisheries habitat features were mapped first, and soil and vegetation data were then superposed on this information. Thus, geomorphic and fisheries habitat mapping provided a physical context for the collection of data on soil and vegetation characteristics. This approach permitted the field teams to recognize and document relationships between physical and biological characteristics of the site in the field.

After the field surveys were completed, all mapped information was digitized into AutoCAD (AutoCAD Map r. 13). AutoCAD files were reviewed for technical accuracy by the appropriate field staff. Digitized map data were then imported into ArcInfo Geographic Information System (GIS) (version 7.2.1), and were labeled and attributed. Finally, ArcView GIS (version 3.2) was used to create a series of 1:240 map drawings (Baseline Map series, discussed below).

MAP SERIES

The maps associated with this document have been produced in three series to simplify the plots and to clearly illustrate conditions for each map subject area. The map series include:

- Baseline Geomorphic and Fisheries Habitat Map,
- Baseline Soil Map, and
- Baseline Vegetation Map.

Because information shown on the three map series is spatially referenced to a single coordinate system, any combination of subject area parameters can be produced for analysis or display. While the maps provided here illustrate the data collected as part of the initial site inventory effort, the utility of the mapping effort extends into project planning, analysis, design, and implementation.

GEOMORPHIC AND FISHERIES HABITAT

The field methodology for the geomorphic and fisheries habitat inventory was designed to characterize key surfaces and features using a standardized mapping format. Key geomorphic characteristics of the project reach were identified, and a standardized system of classification was developed and field-tested by senior project engineers and stream geomorphologists (Figure 1). Similarly, key features required for the assessment of fish habitat quality were identified in the field by a senior fisheries biologist and incorporated into the site inventory methodology. Geomorphic and fisheries habitat features identified during the site inventory are summarized below. All information collected in the field was entered into the GIS database for future analysis purposes; however, for graphic and subject clarity, not all of the information collected is shown on the geomorphic and fisheries habitat map series (Baseline Geomorphic and Fisheries Habitat Map, Sheets 1 – 12). As described above, the map series product illustrates field mapping efforts; information in the database beyond what is shown on the current map series will be used during project analysis and alternatives development.

In addition to planimetric features, the maps show the locations of cross sections surveyed in the field. These cross sections were surveyed using a total-station instrument and are marked ("monumented") in the field for future reference. GPS control surveys for the locations of cross section endpoints were completed by District survey personnel. These control surveys are tied to the location coordinate system for the topographic base maps. Cross sections are numbered sequentially from downstream to upstream; the numbering system provides flexibility to permit adding sections during the design and monitoring phases of the project, if necessary. Information from the cross section survey has been incorporated into a hydraulic model of the project area, and will be used in combination with the results of planimetric mapping for project analysis and design.

Geomorphic and Fisheries Habitat Features

The following geomorphic and fisheries habitat features were mapped in the field (listed in order shown on map legend):

- low flow, or edge of water at time of the field survey (the map polygon defines a low flow area);
- bars;
- slope and bench surfaces outside the low flow area and higher in elevation than bar surfaces;
- existing bank protection features;

- constructed earth berms;
- undercut banks (mapped where undercut ≥2 feet);
- bank erosion (mapped where eroded surface was ≥3 feet high);
- pools, riffles, and runs within the low flow channel area;
- instream woody material (IWM).

In addition, the following types of field data were collected:

- bed material type (sand, sand and gravel, gravel, or cobble) in each pool, riffle, and run habitat unit;
- percent instream aquatic vegetation in each pool, riffle, and run habitat unit; and
- pebble counts characterizing sediment size on bar surfaces.

These additional data are included in the project GIS database, but are not shown on the map series.

Mapping and Field Data Collection Methodology

Geomorphic and fisheries habitat features were drawn on the base maps working outward from the stream channel. Taped measurements were taken as needed to establish the location of boundaries obscured by vegetation in the aerial photographic base maps. In many cases, a tape was laid out perpendicular to the channel, and measurements were taken at boundary locations between edge of water, bar surfaces, benches, and slope surfaces. The following paragraphs provide additional detail on criteria used to identify mapped geomorphic and fisheries habitat features (Figure 1), and on the mapping process.

Low Flow

A low-flow polygon, defined by two edge-of-water lines drawn on the base maps, was delineated first; fish habitat features were then delineated. The low-flow polygon was defined for conditions at the time of mapping. Additional information on channel geometry, including the width of the channel at various depths, is available from surveyed cross sections.

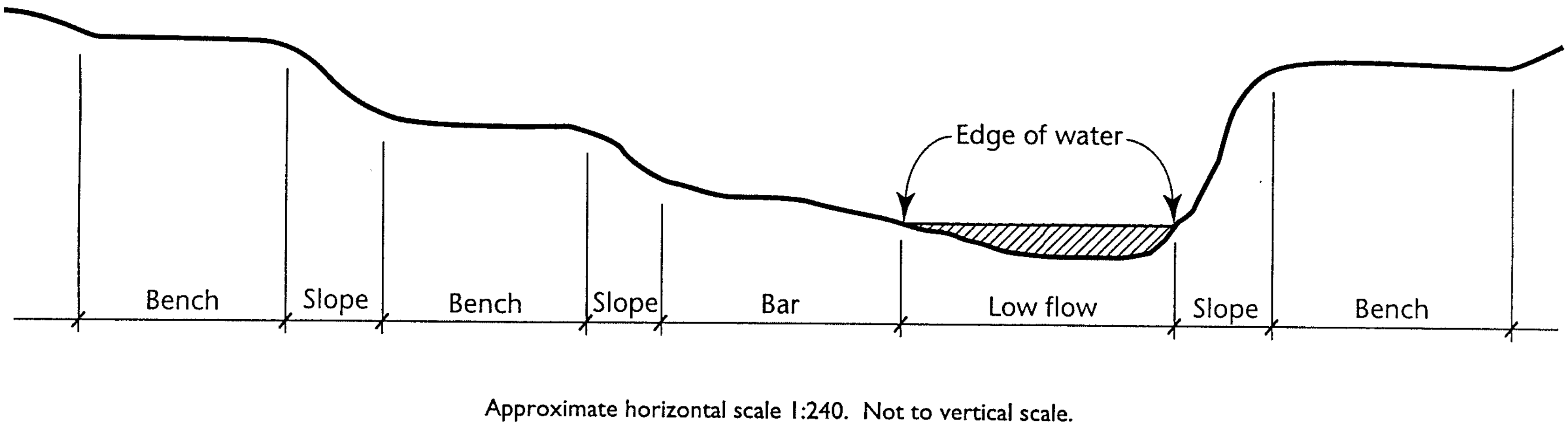

Figure 1. Sketch illustrating different types of geomorphic surfaces mapped during site inventory (see discussion in text).

Bars

Working outward from the channel, bar surfaces were mapped next. For the purposes of this survey, bars were defined as surfaces of recently deposited coarse sediment (typical of channel bed material) that become part of the channel bottom during higher streamflow conditions. Bar surfaces are the lowest surfaces adjacent to the water's edge and in many cases exhibit exposed gravel surfaces with little or no vegetative cover. Pebble counts were taken on several of the bars to characterize sediment size.

Slopes and Benches

Following the delineation of bar surfaces in the channel, surfaces higher in elevation than the channel bar surfaces and subject to inundation by floods of various magnitudes were mapped. These higher surfaces were identified as either benches or slopes. No attempt was made in the field to make correlations between bench surfaces based on their elevations above the channel invert or to relate them to flood frequencies. Natural stream systems commonly exhibit continuity in the elevations of floodplain and terraces related to specific formative flow discharges or geomorphic epochs. The surfaces outside the main channel in the project reach of Guadalupe Creek have largely been influenced by human modifications, and generally have not been formed solely by natural geomorphic processes. Additional analysis is therefore required to refine the classification of these surfaces for use in project planning and design. The significance of benches at particular locations and elevations in the project area will be interpreted in subsequent analyses using modern and historical hydrologic, hydraulic, and geomorphic information.

Bank Protection

Areas along the channel with existing bank protection were also mapped. Bank protection was identified wherever material had been placed to protect the channel banks, such as rock or concrete riprap, or concrete slope protection. An area of concrete slope protection about 15 to 20 feet wide with approximately a 2:1 (horizontal:vertical) slope is a key bank protection feature in the project reach. It extends discontinuously for hundreds of feet along the south bank of the channel and is covered to varying degrees by soil and vegetation.

Berm

In addition to bank protection features, a constructed earth berm extending along a portion of the south side of the creek was mapped.

Undercut Bank

Undercut banks are an important component of instream cover for fish. The locations of undercut banks with ≥2 feet of undercut were noted in the field on the base maps. Undercut banks are shown as a line feature on the geomorphic and fisheries habitat map series. The width of undercut banks is annotated in the GIS database.

Bank Erosion

Areas of eroding banks ≥3 feet high were mapped using the designation "bank erosion". Areas mapped as bank erosion are generally steep to near-vertical scarps in the bank of the channel, and typically have little or no vegetation. Bank materials in the project reach vary in size and in resistance to erosion. In some areas mapped as bank erosion, bank materials appear to be relatively resistant and the rate of erosion may be very low. Some of these areas are the result of past or present human disturbance. Therefore, the mapped bank erosion areas should be considered a record of exposed erosional surfaces only, and not a characterization of bank stability. Due to the nearly vertical nature of many of the erosion surfaces, bank erosion is shown as a line feature rather than a polygon on the completed maps. This method was selected to avoid confusion between the planimetric extent of bank erosion and the actual area of the eroded surface. The completed maps show the location of the upper edge of the bank erosion. The width of eroded surface is annotated in the GIS database.

Pool, Riffle, and Run

Fish habitat types within the low flow polygon were subdivided into pools, riffles, and runs. Pools are defined as areas where the channel deepens, slope decreases, back eddies are present, and flow velocities are comparatively low or even negative (upstream flow in eddies). Pools are associated with a hydraulic control, such that water remains in pools even at zero flow; pool depths >18 inches were also noted, because of the importance of these features as habitat. Riffles are defined as areas where the channel slope is relatively steep, flow is shallow and relatively rapid, and surface turbulence is present to some extent. Runs exhibit some of the characteristics of riffles, but flow in runs is more uniform than that in riffles, and surface turbulence is absent in runs.

As each fish habitat type was classified, additional data were collected including bed material type (e.g. sand, sand and gravel, gravel and cobble) and percent channel area containing aquatic vegetation.

Instream Woody Material

Instream woody material (IWM) is an important component of instream cover for fish. The location of IWM was noted on the base maps only where the material was of sufficient size to be considered a stable feature of the channel.

SOILS AND GROUNDWATER HYDROLOGY

The field methodology for the soils and groundwater hydrology inventory was designed to identify and map key soil characteristics. Senior soil scientists developed an inventory and mapping system that classifies site-specific soil characteristics in the project area. The soil profiles were logged on soil description forms (Appendix A). Data collected in soil test pits were extrapolated to create a map showing the surface distribution of different soil types in the project area. This information was mapped on an acetate overlay on the geomorphic and fisheries habitat field maps.

Soil and groundwater hydrology features recorded in the field are summarized below. All information collected in the field was entered into the GIS database for future analysis purposes; however, for graphic and subject clarity, not all of the information collected is shown on the soil map series (Baseline Soil Map, Sheets 1 – 12).

Soil and Groundwater Hydrology Features

The following field tasks were included in the soil and groundwater hydrology phase of the site inventory:

- soil test pits were dug at selected locations,
- the soil profile was described in each test pit,
- depth to groundwater was recorded in each test pit,
- piezometers were installed in selected soil test pits, and
- soil map units were designated, based on soil profile descriptions.

Mapping and Field Data Collection Methodology

Soils in Santa Clara County were mapped in 1968 by the Soil Conservation Service (SCS) (now called the Natural Resources Conservation Service) (Soil Conservation Service 1968). Before initiating field study of site soils and hydrology, Jones & Stokes staff reviewed these published data for background information on the general characteristics of native soils in the project area.

On November 17-19, 1999, Jones & Stokes staff examined soil properties in 22 backhoe test pit locations (labeled S1 through S22 on the Baseline Soil Map) within the proposed project area, in order to gather more detailed soil information than that available in published sources. Soil characteristics were also studied at selected streambank exposures in the project area. Soil profile descriptions prepared for this project follow standard pedologic conventions, but stress the characteristics of area soils that will constrain the suitability of the proposed project site for riparian habitat restoration, including:

- texture;
- presence of potentially restrictive layers;
- depth to potentially restrictive layers, where present;
- coarse fragment (gravel, cobble, and boulder) content;
- presence and nature of redoximorphic features[1];
- depth to groundwater or apparent water table, if present; and
- vertical and horizontal distance from the base-flow channel of Guadalupe Creek.

Sample soil description forms are included with this report as Appendix A.

Nineteen of the 22 test pits were located on the north side of Guadalupe Creek (Baseline Soil Map, Sheets 1-12). Pit locations were chosen to best characterize the range of soil conditions on the different geomorphic surfaces identified in the project area; several pits were specifically placed in areas through which the creek may be rerouted during restoration. In nearly all cases, test pits were excavated until the local water table was reached. When time or hydrologic conditions precluded measurement of the actual depth to the water table, the depth to the apparent water table was determined by locating the upper limit of saturated soil in the test pit. Depth of excavation in test pits ranged from 35 to 127 inches; average excavation depth was 83 inches.

Based on the range of soil properties observed during field investigations, each soil profile was classified as belonging to one of five standardized soil types. These standardized soil types are designated A, B, C, D, and E. Within type A, B, C, and D soils, either of two subphases may be recognized. One is based on the presence or absence of a cobbly surface armor in a type A, B, C, or D soil. The other is based on the presence of groundwater at depths of less than 8 feet below the ground surface in a type A, B, C, or D soil. The 8-foot cutoff represents the approximate penetration depth for the root systems of most common woody riparian plant species; if the water table is deeper than 8 feet, most common woody riparian plants will have difficulty reaching groundwater during the dry season.

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[1] Redoximorphic features, formed by the processes of reduction, translocation, and/or oxidation of iron and manganese oxides, are indicative of prolonged past or present soil saturation. In soils without a subsurface restrictive layer (i.e., soils that are "subirrigated"), redoximorphic features may be used to estimate the past or present seasonal high groundwater level. Redoximorphic features were formerly known as mottles, concretions, soft masses, and low chroma colors (U.S. Department of Agriculture, Natural Resources Conservation Service 1996).

Standard mapping procedures and professional judgment were used to extrapolate test-pit soil data to create a map showing the surface distribution of different soil types in the project area (Baseline Soil Map, Sheets 1-12). Soil map units were based on the soil types and phases described in the preceding paragraph; they are described in greater detail below, and are summarized in Table 1.

In addition to soils mapping, this phase of the survey included installing piezometers at eleven selected soil test pit locations (labeled P1 through P11 on the Baseline Soil Map), in order to monitor groundwater elevations at various distances from Guadalupe Creek throughout the year. Each piezometer consists of two 5-foot sections of 2-inch (inside diameter) PVC pipe; the lower section is perforated and the upper section is nonperforated. Piezometers were installed in the test pits during backfilling with excavated soil material, and were cut to stand approximately 8 inches above the ground surface. The tops of the piezometers were then capped, and their locations were surveyed relative to a known datum to allow determination of groundwater elevations relative to mean sea level.

Existing Soil Survey Information

The SCS has mapped the soils along the project reach of Guadalupe Creek as Yolo silty clay loam (0 to 2% slopes) and as Garretson gravelly loam (0 to 5% slopes) (Soil Conservation Service 1968). The Yolo soil, which is present primarily at the western and eastern ends of the project reach, consists of silty clay loam and silt loam alluvium and is more than 5 feet thick. Under natural conditions, the Yolo soil is well drained and has moderately slow permeability. The Garretson soil occurs along the remaining sections of the project reach. It consists of loam and sandy loam alluvium to a depth of 40 inches, and of stratified sand and gravel from depths of 40 inches to depths of more than 5 feet. Under natural conditions, the Garretson soil is well drained and has moderate permeability.

Soil Map Units

Complete soil profile descriptions for each of the 22 test pit locations along the project reach of Guadalupe Creek are presented in Appendix A. The soil map units derived from the range of soil properties observed in these test pits are described below, and summarized in Table 1. The Baseline Soil Map shows the surface distribution of the various soil units at the project site.

Anthropogenic materials occur at various depths within the soil profile in all of the soil units mapped, with the exception of Soil Map Unit A, deep groundwater phase. Thus, Soil Map Unit A—which consists of the Garretson soil described by the SCS (1968)—probably contains the only intact, native soil in the project area. The remaining eight soil map units have apparently experienced significant disturbance in the past and do not appear to represent native soil conditions.

Soil Map Unit A, Deep Groundwater Phase

Soil Map Unit A, deep groundwater phase typically consists of 30 inches of loam to clay loam underlain by ≥90 inches of very gravelly to extremely gravelly sandy loam and loamy sand. A very hard to extremely hard (when dry) clay loam horizon occurs in most places between the depths of 5 and 30 inches. Soil Map Unit A occurs exclusively on the broad grassland terrace located at the southeastern (upstream) end of the project reach. Soil Map Unit A is well drained and has moderate permeability. Depth to the apparent water table is greater than 96 inches (8 feet) in Soil Map Unit A, deep groundwater phase.

Soil Map Unit B

Soil Map Unit B typically consists of 10 inches of loam to sandy loam topsoil underlain by ≥90 inches of gravelly to very gravelly sandy loam to sandy clay loam. Where subsoil textures are sandy clay loam or finer, subsoil consistency is typically very hard to extremely hard (when dry). Soil Map Unit B typically occurs on upper floodplain and terrace surfaces, is well drained, and has moderate permeability. Depth to the apparent water table ranges from 63 to 91 inches and averages 77 inches in Soil Map Unit B.

Soil Map Unit Bd, Deep Groundwater Phase

Soil Map Unit Bd, deep groundwater phase consists of the same soil as in Soil Map Unit B. Depth to the apparent water table is >96 inches (>8 feet) in Soil Map Unit Bd, deep groundwater phase.

Soil Map Unit C

Soil Map Unit C typically consists of 10 inches of gravelly sandy loam to loam topsoil underlain by ≥60 inches of very gravelly to extremely gravelly loamy sand and sandy loam. This unit shows coarser textures and has a higher coarse fragment content

Table 1. Descriptions of Soil Map Units.

Map Unit (pit #s)	**Description**	
A, deep groundwater phase (S 1,2,3)	0-30"	loam to clay loam (<15% coarse fragments)
	30-120"	sandy loam to loamy sand (35-85% coarse fragments)
	Groundwater occurs at depths >8 feet below ground surface during dry season.	
B (S 5,7,8,10)	1-10"	loam to sandy loam (<15% coarse fragments)
	10-100"	sandy clay loam to sandy loam (15-60% coarse fragments)
	Groundwater occurs at depths <8 feet below ground surface during dry season.	
B, deep groundwater phase (S4)	1-10"	loam to sandy loam (<15% coarse fragments)
	10-100"	sandy clay loam to sandy loam (15-60% coarse fragments)
	Groundwater occurs at depths >8 feet below ground surface during dry season.	
C (S 13,18,20)	1-10"	loam to sandy loam (5-25% coarse fragments)
	10-70"	sandy loam to loamy sand (30-85% coarse fragments)
	Groundwater occurs at depths <8 feet below ground surface during dry season.	
C, deep groundwater phase (S17)	1-10"	loam to sandy loam (5-25% coarse fragments)
	10-70"	sandy loam to loamy sand (30-85% coarse fragments)
	Groundwater occurs at depths >8 feet below ground surface during dry season.	
C, cobbly surface phase (S 14,15,16,19)	1-10"	loam to sandy loam (20-40% coarse fragments)
	10-70"	sandy loam to loamy sand (30-85% coarse fragments)
	Nearly continuous surface armor of cobbles and gravels. Groundwater occurs at depths >8 feet below ground surface during dry season.	
D (S 6,9,11,21,22)	0-15"	silt loam, loam to sandy loam (<10% coarse fragments)
	15-30"	silty clay loam to sandy clay loam (5-40% coarse fragments)
	30-70"	sandy loam to sandy clay loam (30-75% coarse fragments)
	Groundwater occurs at depths <8 feet below ground surface during dry season.	
D, deep groundwater phase (S12)	0-15"	silt loam, loam to sandy loam (<10% coarse fragments)
	15-30"	silty clay loam to sandy clay loam (5-40% coarse fragments)
	30-70"	sandy loam to sandy clay loam (30-75% coarse fragments)
	Groundwater occurs at depths >8 feet below ground surface during dry season.	
E	Undifferentiated soil materials on cut-slopes, fill-slopes, and eroding banks. Soil properties such as texture and coarse fragment content are variable, and may include the range of properties represented by map units A, B, C, and D. Depth to groundwater is also variable, but generally increases with increasing distance from and elevation above the stream channel.	

Note: "Coarse fragments" refers to rock particles larger than 2 mm in diameter (e.g., gravel, cobbles).

than other soil types in the project area. Soil Map Unit C occurs on lower and upper floodplain surfaces, is somewhat excessively drained and has moderately rapid permeability. Depth to the apparent water table in Soil Map Unit C ranges from 35 to 78 inches and averages 62 inches.

Soil Map Unit Cc, Cobbly Surface Phase

The soil composing Soil Map Unit Cc, cobbly surface phase is the same as that in Soil Map Unit C; Soil Map Unit Cc, cobbly surface phase is distinguished by the presence of an armoring layer of gravel- to cobble-grade fragments on the ground surface. Depth to the apparent water table in Soil Map Unit Cc, cobbly surface phase ranges from 59 to 78 inches and averages 68 inches.

Soil Map Unit Cd, Deep Groundwater Phase

The soil composing Soil Map Unit Cd, deep groundwater phase is the same as that in Soil Map Unit C; depth to the apparent water table in Soil Map Unit Cd, deep groundwater phase is >96 inches (>8 feet).

Soil Map Unit D

Soil Map Unit D typically consists of 15 inches of sandy loam, silt loam, or sandy loam topsoil underlain by 15 inches of gravelly sandy loam to silty clay loam. Below a depth of 30 inches, this unit typically comprises very gravelly to extremely gravelly sandy loam. Moderate cementation of the soil matrix is present in the middle part of the soil profile in some of the upstream areas where Soil Map Unit D occurs.

The soil in Soil Map Unit D is very similar to that in Soil Map Unit C. The primary difference between Soil Map Units C and D is that Soil Map Unit D contains a fine-textured horizon between depths of 15 and 30 inches, whereas this horizon is absent from Soil Map Unit C. Like Soil Map Unit C, Soil Map Unit D typically occurs on lower and upper floodplain surfaces. Soil Map Unit D is somewhat excessively drained and has moderate permeability. Depth to the apparent water table in Soil Map Unit D ranges from 51 to 77 inches, and averages 64 inches.

Soil Map Unit Dd, Deep Groundwater Phase

Soil Map Unit Dd, deep groundwater phase consists of the same soil as that in Soil Map Unit D; depth to the apparent water table is >96 inches (8 feet).

Soil Map Unit E

Soil Map Unit E consists of undifferentiated soil materials on cut-slopes, fill-slopes, berms, and eroding banks. No soil test pits were excavated in this map unit. However, incidental observations of soil properties in Soil Map Unit E were made at existing exposures when possible. Soil properties such as texture and coarse fragment content are variable in Soil Map Unit E; the spectrum of variation likely includes—but may not be limited to—the range of properties characterizing the other soil map units. Depth to the water table in Soil Map Unit E is also variable, but generally increases with increasing distance from and elevation above the creek channel.

Groundwater Hydrology

Measurements of depth to the apparent water table collected in three sets of adjacent soil test pits (Soil Pits S6, S7, and S8; Soil Pits S5 and S21; and Soil Pits S19 and S20) (see Baseline Soil Map, Sheets 1, 8, and 9) permit general characterization of the local groundwater profile as it extends north from the baseflow channel of Guadalupe Creek. Groundwater elevations decrease relatively steeply away from the baseflow channel, until a distance is reached at which the elevation of the water table appears to stabilize and remain relatively constant. In the vicinity of Soil Pits S5, S6, S7, S8, and S21 (Baseline Soil Map, Sheets 8 and 9), this distance appears to be approximately 100 feet. Comparing the apparent depth to groundwater at these test pit locations to the elevation of the baseflow channel indicates that Guadalupe Creek is a losing stream. More information on the groundwater profile will become available as piezometer data are collected throughout the duration of this project.

VEGETATION

The field methodology for the vegetation inventory was designed to characterize vegetation types and features using a standardized mapping format. Senior vegetation ecologists and biologists worked closely with the members of the geomorphic and fisheries habitat mapping team to develop a mapping system that illustrates the relationship between geomorphic characteristics and vegetation types along the project reach. Mapping vegetation directly onto the geomorphic and fisheries habitat field maps permitted collection of a dataset with sufficient detail to support future analysis and alternatives development.

Vegetation features recorded in the field are summarized below. All information collected in the field was entered into the GIS database for future analysis; however, for graphic and subject clarity, not all of the information collected is shown on the vegetation map series (Baseline Vegetation Map, Sheets 1 – 12). Specifically, number of trunks (collected for western sycamore, *Platanus racemosa),* diameter at breast height (dbh) (also collected for western sycamore), and percent cover on bar surfaces are omitted from these maps.

Vegetation Features

The following vegetation features were mapped in the field:

- boundaries of areas of designated understory and midstory vegetation types (described below), and
- tree and shrub canopies.

In addition, data on the following were collected:

- presence of non-native invasive tree and shrub species,
- percent cover of herbaceous and woody plant species on bar surfaces,
- location and height of tree saplings on bar surfaces, and,
- for western sycamore only, dbh and number of trunks.

Mapping and Field Data Collection Methodology

Existing vegetation features in the project area were mapped directly on the geomorphic and fisheries habitat field maps. Vegetation type boundaries were defined by reviewing the mapped geomorphic surfaces, interpreting aerial photographic signatures, and conducting field measurements on site. Staff biologists mapped vegetation types based on the composition of understory and midstory vegetation in addition to mapping tree and shrub canopies. A more standard vegetation classification system was not used in field mapping because the overstory species in the Guadalupe Creek corridor span a wide range of geomorphic surfaces; thus the relationship between physical conditions and overstory vegetation type is too general for future analysis and design purposes. Mapping understory and overstory vegetation separately, and delineating tree and shrub canopies, produced a vegetation map providing a more accurate and detailed characterization of site vegetation than would have been possible with standard methodologies, as well as showing the relationship between vegetation and site topography.

Five understory and midstory vegetation types are shown as polygons on the Baseline Vegetation Maps. They include: unvegetated areas, annual grassland, herbaceous riparian, shrub/vine scrub, and willow scrub. In many cases, the polygon boundary reflects a geomorphic surface boundary. Mapped vegetation types are described in more detail below and are shown on the Baseline Vegetation Maps (Sheets 1–12).

Additional information shown on the baseline maps includes the locations of tree and shrub canopies. Tree canopies were located on the geomorphic and fisheries habitat field map by interpreting overstory signatures on the aerial photographic base and field-measuring the distance to known reference points. Each canopy was identified with the appropriate species code and transferred to the GIS database. For western sycamores, many of which have multiple trunks, dbh was recorded for each trunk, and the location of the trunk or trunk cluster was also estimated. (If needed during detailed design, the exact location of specific trees will be field surveyed.) Shrub canopies and shrub species within areas of the annual grassland vegetation type were also identified on the field maps; however, with the few exceptions noted on the maps, this level of detail was not attainable in areas of other vegetation types, because individual shrubs are obscured by overlapping canopy layers.

Several other types of information were recorded in the field for inclusion in the GIS database, but are not shown on the maps. The percentages of herbaceous and woody vegetation cover were recorded for geomorphic surfaces delineated within the active channel, primarily low flow and bar surfaces. Tree saplings were also mapped individually, and their heights measured; scattered woody seedlings and small saplings of native riparian tree species are primarily found on low bar surfaces within the herbaceous riparian vegetation type. In addition, all non-native invasive plant species, such as scotch broom *(Cytisus scoparius)*, fan palm *(Washingtonia* sp.*)*, and tamarisk *(Tamarix* sp.*)*, were mapped and recorded.

Understory and Midstory Vegetation Types

Five understory and midstory categories were identified on the project site, including unvegetated areas, annual grassland, herbaceous riparian, shrub/vine scrub, and willow scrub.

Unvegetated

Areas with less than 10% vegetation cover were mapped as unvegetated. The sparse vegetation that occurs in these areas consists almost exclusively of species found in the annual grassland areas of the project site.

Annual Grassland

Areas dominated by non-native annual grasses and low forbs, such as yellow star thistle *(Centaurea solstitialis)*, were mapped as annual grassland. Areas mapped as annual grassland include small patches of unvegetated ground (<10% cover) and areas of sparse vegetation. Scattered vines and shrubs also occur in annual grassland areas. Species found in areas of this vegetation type include wild oat *(Avena fatua)*, brome *(Bromus* sp.*)*, and wild fennel *(Foeniculum vulgare)*.

Herbaceous Riparian

Herbaceous riparian habitat at the project site includes areas dominated by both obligate and facultative wetland species (Reed 1988); some upland species, including those found in the annual grassland areas, also occur in herbaceous riparian areas of the project site. In addition, although areas mapped as herbaceous riparian include most of the jurisdictional wetland habitat at the project site, much of this area is not jurisdictional wetland habitat. Species found in this vegetation type include nutsedge *(Cyperus eragrostis)*, cattail *(Typha latifolia)*, common horsetail *(Equisetum arvense)*, and Bermuda grass *(Cynodon dactylon)*.

Shrub/Vine Scrub

The shrub/vine scrub vegetation type at the project site is dominated by a dense layer of shrub and vine species, including Himalayan blackberry *(Rubus discolor)*, periwinkle *(Vinca major)*, willows *(Salix exigua, S. laevigata, S. lasiolepis)*, coyote brush *(Baccharis pilularis)*, mule fat *(Baccharis salicifolia)*, and poison oak *(Toxicodendron diversilobum)*.

Willow Scrub

The willow scrub vegetation type at the project site is dominated by dense stands of sandbar willow *(Salix exigua)*, red willow *(Salix laevigata)*, and arroyo willow *(Salix lasiolepis)*. Willow species make up 90% or more of the woody species cover within this vegetation type.

Citations

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U. S. Department of Agriculture, Natural Resources Conservation Service. 1996. Field indicators of hydric soils in the United States. G. W. Hurt, Whited, P. M., and Pringle, R. F., eds. USDA, NRCS. Fort Worth, TX.

A

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration

Date: 11/18/99

Investigator: JB\SF

Location/Site S1 (P1)

Pit Auger [✓ Backhoe] Drill Rig

Geographic Coord. —

Soil map unit —

Landform Terrace

Slope 0-1 %

Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
A1	0-5	L	3 gr	—	MF/FM	H	—	
A2	5-29	CL	10 gr	—	FF/FM	M	—	v. Firm (moist)
C	29-119	VGLCS	8Co/60gr	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content): —

Hydrology Depth to free water= — Depth to apparent water table= 116 Flood Frequency=

Vegetation

Comments

↳ Pit located ~160' from channel

↳ 10' piezometer installed.

↳ (2 x 5' sections)

A

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/18/99
Investigator: JB/SE	

Location/Site S2 (P2)	Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —			
Landform Terrace	Slope 0 - 1 %	Aspect —		

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
A	0-6	l	2G	—	MF	H	–	
C1	6-16	cl	10G	—	CM, FF	M	FEW, COARSE REDOX. CONC	
C2	16-26	VGSL	60G 5C	–	FF, FM	L	–	
C3	26-34	SL	10 G	–	FM, FF	L	–	
C4	34-65	EGLCS	80G CS	–	FM, FF	L	–	
C5	65-114	VGSL	10C 50G 5S	—	FM, FF	L	–	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= – Depth to apparent water table= > 114 Flood Frequency=

Vegetation

Comments

↳ Pit located ~ 65' from channel

- 10' piezometer

A

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11-17-99
Investigator: JB/JF

Location/Site S3 (P3)
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord.
Soil map unit GARRETSON GRAVELLY LOAM
Landform TERRACE
Slope 0-1 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
A	0-9	cl	G3	—	MF	H	—	
C1	9-32	cl+	G 10	—	FF, FM	M	—	VERY HARD (dry)
C2	32-70	SCL	G15	—	FF	M	—	
C3	70 127	VGSL	G60 C10	—	FF, M	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= — Depth to apparent water table= 124 Flood Frequency=

Vegetation

Comments

AT 4' ± DOWN, WE HIT THE CONCRETE STORM DRAIN PIPE (24-30")

↳ 10' piezometer installed.

↳ Pit is approximately 45' from Terrace bank.

Deep

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11/18/99
Investigator: JB/SF

Location/Site S4 (P4)
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. —
Soil map unit —
Landform TERRACE / HIGH FLOODPLAIN
Slope 0-1 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-4	GL	20G	—	CF	H	—	—
C1	4-65	GSCL	3C 25G	—	FC, M, F	L	—	very firm cons. (moist)
C2	65-124	EGSL	10C 70G	—	C, M, F	L	—	—

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= — Depth to apparent water table= 119" Flood Frequency=

Vegetation

Comments

↳ Pit located ~ 15-20' from stream bank.

10' piezometer

B

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/18/99
Investigator: SF/JB	

Location/Site S5		Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —				
Landform Terrace	Slope 0-1 %	Aspect —			

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
AC	0-8	SCL	3Co/3gr	—	MF	M	—	
C1	8-20	GSL	5Co/15G	—	FF	L	—	
C2	20-62	VGSCL	5Co/40G	—	—	L	—	V. Hard consistence (dry)
C3	62-95	VGSL	10Co/50G	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 91 Flood Frequency=

Vegetation

Comments

-> Pit located ~ 30' from intersection of terrace and High floodplain.

D

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11 - 17 - 95
Investigator:	

Location/Site S6 (05)	Pit	Auger	[✓ Backhoe]	Drill Rig

Geographic Coord. –	Soil map unit –	
Landform HIGH FLOODPLAIN	Slope 2 %	Aspect –

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
A	0-7	L	0	–	CF	M	–	
C1	7-17	SL	5	–	FF	L	–	DRY
C2	17-43	VG CSL	C5 G35	–	ff	L	–	DRY
C3	43-55	VG SCL	C10 G40	–	–	L	–	MOIST

Restrictive layers
(kind, depth to, thickness, hardness, clay content): –

Hydrology Depth to free water= – Depth to apparent water table= 51" Flood Frequency=

Vegetation

Comments

PIT 20' FROM CHANNEL

5' PIEZOMETER

B

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration Date: 11-17-99
Investigator: JB/SF

Location/Site S7 (06) Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. Soil map unit —
Landform TERRACE Slope 0 % Aspect N/A

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-8	L	10gr	—	cF	H	—	—
C1	8-37	GSCL	25gr	—	FM	L	—	Few v. large Sandstone boulders.
C2	37-46	G S:CL	30gr	—	FM	L	—	—
C3	46-67	GLS	30gr	—	FM	L	—	—

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 63 Flood Frequency=

Vegetation

Comments

↳ PIT LOCATED ≈ 90' FROM CHANNEL

↳ 10' piezometer used.

5

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/17/99
Investigator: SF / JB	

Location/Site S8 (P7)	Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —			
Landform Terrace	Slope 0-1 %	Aspect —		

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-5	L	5gr	—	FF	M	—	
C1	5-36	GL	30gr	—	—	L	—	
C2	36-56	VG-SCL	35gr	—	—	L	—	
C3	56-76	G SiCL	25gr	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content): NONE

Hydrology Depth to free water= — Depth to apparent water table= 71 Flood Frequency=

Vegetation

Comments

↳ Pit located ~ 140' FROM CHANNEL

↳ 10' piezometer used.

2

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration

Date: 11/17/99

Investigator: SF/JB

Location/Site S9

Pit Auger [✓ Backhoe] Drill Rig

Geographic Coord. —

Soil map unit —

Landform Terrace

Slope 0-1 %

Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
A	0-8	L	10 G	–	cf	H	–	
C1	8-32	VGSL	40G	–	—	L	–	
C2	32-81	EGSCL	65 G 10G	–	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= – Depth to apparent water table= 77" Flood Frequency=

Vegetation

Comments

↳ Pit is located ~ 8' from terrace bluff.

↳ SCVWD Reveg. Botanist (Linda) on site.

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11/17/99
Investigator: SF / JB

Location/Site S 10
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. —
Soil map unit —
Landform Terrace
Slope 0 - 1 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-10	L	5-7gr	—	MF	H	—	—
C1	10-37	~~V~~gSCL	5co/35gr	-	FF	L	—	Very to extremely
C2	37-50	gSCL	2co/20gr	-	—	L	—	hard consistence
C3	50-94	VgrSCL	2co/35gr	—	—	L	—	When dry

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 84" Flood Frequency=

Vegetation

Comments

↳ SCVWD Reveg. Botanist onsite

↳ Pit is located ~ 30-40' from terrace bluff.

D

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/17/99
Investigator: SF/JB	

Location/Site S11 (P8)	Pit	Auger	[✓ Backhoe]	Drill Rig

Geographic Coord. —	Soil map unit —	
Landform high floodplain.	Slope 0 – 1 %	Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
Ac	0-9	L	—	—	mF/FM	H	—	—
C1	9-22	SICL	5 G	–	–	L	CF & D	RELICT MOTTLES?
C2	22-60	VG SL	10 C 35 G	–	–	L	–	
C3	60-66	VG SCL	35 G 5 C	–	–	L	–	

Restrictive layers
(kind, depth to, thickness, hardness, clay content): NONE

Hydrology Depth to free water= – Depth to apparent water table= 64 Flood Frequency=

Vegetation

Comments

↳ Pit ~ 7 ft from edge of terrace bluff and from low flow channel

5' PIEZOMETER

?
Deep

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11/17/99
Investigator: SF/JB

Location/Site S12
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. —
Soil map unit —
Landform Terrace
Slope 0-1 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
A	0-13	GL	15 C 15 G	—	CF	H	—	
C1	13-26	VG SCL	20 C 50 G	—	—	L	—	VERY DENSE
C2	26-74	EG SL	10 C 55 G	—	—	L	—	
C3	74-100	VG SCL	30 G 10 C	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= — Depth to apparent water table= 98" Flood Frequency=

Vegetation

Comments

↳ Pit located ~15 ft from terrace bluff and from low flow channel edge.

↳ Entire profile, except for A horizon, is cohesive.

C

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11-17-99
Investigator: JB / SF

Location/Site S13
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. —
Soil map unit —
Landform Low Floodplain
Slope 5 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-11	VfSL	—	—	mf	M	—	—
C1	11-24	fSL	3 gr	—	ff	L	—	Firm, Hard
C2	24-40	VGSL	7 C 40G	–	–	L	–	
C3	40-68	EGLCS	75G 5C	–	–	L	–	
C4	68-78	GSCL	20G 3C	–	–	L	–	

Restrictive layers
(kind, depth to, thickness, hardness, clay content): –

Hydrology Depth to free water= – Depth to apparent water table= 78" Flood Frequency=

Vegetation

Comments

↳ plastic straw noted at ~28 inches

≤
—
Cobbly

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/18/99
Investigator: JB / SF	

Location/Site S14	Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —			
Landform Low Floodplain	Slope 0-1 %	Aspect —		

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-3	GLS	30 gr	—	CF	M	—	—
C1	3-16	VGS	60 gr	—	—	L	—	Stratified.
C2	16-23	VGCSL	60gr/5co	—	—	L	—	—
C3	23-66	EGLCS	65G/10co	—	—	L	—	pockets of reddish-grey clayey material.

Restictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 63 Flood Frequency=

Vegetation

Comments

↳ pit located ~ 10' from stream-edge.

↳ ground surface ~ 1' above baseflow water elevation.

C

Cobbly Surface

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11/18/99
Investigator: JB/SF

Location/Site S15
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. ——
Soil map unit ——
Landform Low Floodplain/Gravel bar.
Slope 0-1 %
Aspect ——

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-3	GSL	20gv/3co	—	CF/FM	M	—	—
C1	3-25	VGLCS	35gv/3co	—	FF/FM	L	—	—
C2	25-45	VGSL	40gr/10co	—	FF	L	—	—
C3	45-70	EGLCS	80gv/5co	—	—	L	—	—

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 67 Flood Frequency=

Vegetation

Comments

↳ Pit located ~ 4 feet from channel edge.

1

Cobbly
Surface

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11-17-99
Investigator: SB / SF

Location/Site S 16 (09)
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord.
Soil map unit —
Landform LOW FLOODPLAIN
Slope 0 %
Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
AC	0-6	fSL	1 gr	—	mf/fm	H	—	—
C1	6-25	VGSL	15 C 30 G	-	—	L	-	-
C2	25-67	EGLCS	15 C 70 G	-	—	L	-	—

Restrictive layers
(kind, depth to, thickness, hardness, clay content): —

Hydrology Depth to free water= - Depth to apparent water table= 65 Flood Frequency=

Vegetation

Comments

↳ long piezometer (10')

C

Deep

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11-17-99
Investigator: JB, SF	

Location/Site S17 (P10)	Pit	Auger	[✓ Backhoe]	Drill Rig

Geographic Coord. —	Soil map unit —	
Landform HIGH FLOOD PLAIN	Slope %	Aspect

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
A	0-8	MIXED SL TO CL	5 G	—	MF, FM	M	FEW FAINT CONC.	
C1	8-14	CL	10 G	—	FF	L	—	DENSE
C2	14-38	VCOL	25 G 25 C	—	—	L	—	VERY DENSE
C3	38"-8.5'	VGSL	45 G 10 C	—	—	L	—	LOOSER & REDDER THAN ABOVE

Restrictive layers
(kind, depth to, thickness, hardness, clay content): 14" (COMPACTION)

Hydrology Depth to free water= — Depth to apparent water table= > 8.5' Flood Frequency=

Vegetation

Comments

- LARGE CONCRETE FRAGMENTS AS DEEP AS 57"; HOSE AT 56"
- LONG PIEZOMETER

C

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/17/99
Investigator: SF/JB	

Location/Site S18	Pit	Auger	[✓ Backhoe]	Drill Rig

Geographic Coord. —	Soil map unit —
Landform Low Floodplain	Slope 0-1 % Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
AC	0-8	SL	5	—	MF	H	—	—
C1	8-23	VgSL	20co/40gr	—	—	L	—	—
C2	23-65	CoLCS	30co/40gr	—	FM	—	—	—

Restrictive layers —
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= Depth to apparent water table= 59 inches Flood Frequency=

Vegetation

Comments

↳ plastic Straw at 28 inches

C.
Cobbly
Surface

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/17/99
Investigator: S. Frazier / J. Butterworth	

Location/Site S19	Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —			
Landform Gravel Bar	Slope 0 - 1 %	Aspect —		

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
C1	0-35	VGLCS	20 C 40 G	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content): —

Hydrology Depth to free water= — Depth to apparent water table= 35" Flood Frequency=

Vegetation

Comments

12'± FROM EDGE OF LOW FLOW CHANNEL

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration

Date: 11/17/99

Investigator: S. Frazier

Location/Site S20

Pit Auger [✓ Backhoe] Drill Rig

Geographic Coord. —

Soil map unit —

Landform Low floodplain

Slope %

Aspect —

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
C1	0-11	grl	10 gr	—	mf	H	—	Fill after excavation
C2	11-47	Vgrsl	70 gr	—	—	L	—	Fill " "
C2	47-88	Egcs	75 gr	—	—	L	—	NAVAM

Restrictive layers
(kind, depth to, thickness, hardness, clay content): —

Hydrology Depth to free water= — Depth to apparent water table= 68" Flood Frequency=

Vegetation

Comments

① In C2 horizon, there are pockets of non-gravelly fine-loamy material.

② Plastic bag noted at 35 inches.

D

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration	Date: 11/18/99
Investigator: SF/JB	

Location/Site S21	Pit	Auger	[✓ Backhoe]	Drill Rig
Geographic Coord. —	Soil map unit —			
Landform High Flood plain	Slope 0-1 %	Aspect —		

Horizon	Depth	Texture	Coarse Fragments %	Cementa-tion	Roots	Organic Matter	Redoxi-morphic Features	Comments
A	0-15	FSL	8 gr	—	MF/FM	H	—	—
C1	15-26	GSCL	2Co\20gr	—	FM/FF	M	—	—
C2	26-58	VGSL	8Co\40gr	—	FM/FC/Fc	L	—	—
C3	58-65	SC	10G	-	—	L	-	-

Restictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= - Depth to apparent water table= 62" Flood Frequency=

Vegetation

Comments

↳ pit located ~ 10 ft from Stream bank.

2

JONES & STOKES ASSOCIATES SOIL PROFILE DESCRIPTION FORM

Client/Project: Santa Clara Valley Water District/Guadelupe Creek Riparian Restoration
Date: 11-17-95
Investigator: SB/SF

Location/Site S22 (P11)
Pit Auger [✓ Backhoe] Drill Rig
Geographic Coord. –
Soil map unit –
Landform High floodplain
Slope 10 %
Aspect –

Horizon	Depth	Texture	Coarse Fragments %	Cementation	Roots	Organic Matter	Redoximorphic Features	Comments
A	0-14	SiL	5gr	—	CF	M		—
C1	14-25	SiL	—	—	FF	L	FFP concentrations	
C2	25-47	VGLS	55gr/5co	—	FF	L	—	
C3	47-55	GSiL	20gr/10co	—	—	L	FFP-concentrations.	
C4	55-67	VGSCL	35gr/5co	—	—	L	—	

Restrictive layers
(kind, depth to, thickness, hardness, clay content):

Hydrology Depth to free water= – Depth to apparent water table= 66 Flood Frequency=

Vegetation

Comments

↳ 18' ± from edge of channel

↳ 10' piezometer installed.

Appendix A: Soil Profile Descriptions, Guadalupe Creek Mitigation Project Site